

REMARKS

Claims 31, 34-49 and 52-60 are pending.

Claims 31 and 49 have been amended to incorporate the subject matter of claims 32 and 50, respectively, which have been canceled. Claims 33 and 51 also have been canceled. No new matter has been added.

Specification

The Office action objected to the specification because the phrase “including a number port channels” on page 1, line 25 is incorrect. Applicants have incorporated the Examiner’s suggestion to change this phrase to “including a number of port channels.”

The Office action also objected to the phrase “preferred embodiments of the method are defined in the dependent claims 20 to 30” on page 5 of the specification. Applicants have amended that phrase to read “preferred embodiments of the method are defined in the dependent method claims.”

Applicants respectfully request withdrawal of these objections.

Claim Rejections

Claims 31, 34, 37-41, 44 and 47 were rejected as being obvious over Fuerschbach (US 4,815,534) in view of Usui (US 4,223,826). Claim 32, whose subject matter has been incorporated into claim 31, was rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara (US 4,497,772). Applicants respectfully request reconsideration and withdrawal of the claim rejections in view of the following comments.

Claim 31 recites a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium. The heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. The material includes nickel.

As discussed generally on page 2, lines 6-21 of the present application, brazing a pipe member to stainless steel having chromium has been difficult. If the stainless steel has a significant amount of chromium, it is difficult to achieve a secure connection. If, on the other hand, the stainless steel has a lower amount of chromium, it becomes necessary to use more aggressive and toxic fluxing agents, which raises the likelihood of environmental and health-related problems. In some implementations, the claimed subject matter addresses these difficulties by providing a connection surface that is more susceptible to reduction than chromium dioxide and that makes it easier to achieve a secure connection.

Neither Fuerschbach, Usui, Mizuhara, nor any reasonable combination thereof discloses or renders obvious the claimed subject matter.

The Fuerschbach patent discloses a plate heat exchanger in which stainless steel plates are brazed together in a stacked assembly. *See* Abstract and col. 6, lines 16-20. The heat exchanger includes openings (*e.g.*, 40, 40a, 41 and 41a) that extend through some of the plates. Braze alloy sheets 22 are positioned between some of the plates. *See* FIG. 2. Threaded fittings IO, OC, IH and OH are positioned above a top one of the plates. The assembly is placed in an oven or brazing environment to heat the assembly until the braze alloy sheets become sufficiently molten as to effect a connection of the components as a unitary structure. *See* col. 6, lines 59-64.

The Office action acknowledges that the Fuerschbach patent does not disclose connection surfaces (for pipe members) that include a material that permits brazing of the threaded fittings in a more easy manner than to stainless steel and that is more reduction susceptible than chromium dioxide, as recited in claim 31. Nor does the Fuerschbach patent disclose that the connection surfaces include a material that contains nickel, as is now recited in claim 31.

The Usui patent relates generally to a method of brazing stainless steel. The method includes providing the stainless steel with a copper plating before brazing. *See* col. 2, lines 30-36 and 49-53. The Usui patent does not relate to brazing plate type heat exchangers or to brazing a connection pipe to a connection surface around a port channel of a plate type heat exchanger, as recited in claim 31. The Usui patent also does not disclose providing a material with nickel on

a connection surface (for a pipe member), as recited in claim 31. Indeed, the Usui patent does not mention the word "nickel" at all.

The Mizuhara patent relates to a ductile brazing foil (not a "connection surface") having a composition with a number of elements, including nickel. The brazing foil may be used in brazing various materials (*e.g.*, ceramics, iron-nickel cobalt alloys, super alloys and stainless steel) to aluminum. The Mizuhara patent does not, however, disclose connection surfaces that include a material with nickel, where the material permits brazing of the threaded fittings in a more easy manner than to stainless steel and that is more reduction susceptible than chromium dioxide, as is now recited in claim 31.

Claim 31 should be allowable for at least the foregoing reasons.

Claim 31 also should be allowable because, as discussed below, it would not have been obvious to combine the cited references in the manner asserted. Claim 31 recites a connection surface that includes a material including nickel. As indicated above, the Usui patent discloses providing stainless steel with a copper plating before brazing. The Usui patent, therefore, would have led a person of ordinary skill away from the claimed subject matter.

Claims 34, 37-41, 44 and 47 depend from claim 31 and, therefore, should be allowable for at least the same reasons as claim 31.

Claims 49, 52-55 and 58 were rejected as being obvious over Fuerschbach (US 4,815,534) in view of Usui (US 4,223,826). Claim 50, whose subject matter has been incorporated into claim 31, was rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara. Applicants respectfully request reconsideration of the claim rejections in view of the following comments.

Claim 49 recites subject matter that is similar to the subject matter of claim 31. More specifically, claim 49 recites a method of manufacturing a plate heat exchanger having a number of heat exchanger plates, which are substantially manufactured in stainless steel containing

chromium, and having a number of port channels that extend through at least some of the heat exchanger plates. One or more of the port channels are surrounded by a connection surface for connection of the port channel to a pipe member. The method includes applying a material, which forms the connection surface and which permits brazing of said pipe member to the connection surface in a more easy manner than to stainless steel, where the material is more reduction susceptible than chromium dioxide and where the material includes nickel. The method also includes joining the heat exchanger plates to each other by means of a braze connection.

As discussed above with reference to claim 31 none of the cited references discloses or renders obvious the claimed subject matter.

Claim 49 should be allowable for at least the foregoing reasons.

Claims 52-55 and 58 depend from claim 49 and, therefore, should be allowable for at least the same reasons as claim 49.

Claims 35 and 36 were rejected as being obvious over Fuerschbach in view of Usui and further in view of Wells (US 3,675,311).

Claims 35 and 36 depend from claim 31, which recites a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium. The heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. The material includes nickel.

As discussed above with reference to claim 31, neither Fuerschbach nor Usui, nor any reasonable combination thereof, discloses or renders obvious the claimed subject matter. Nor does the Wells patent, alone or in any reasonable combination with the other references, disclose or render obvious the claimed subject matter.

The Wells patent discloses thin-film diffusion brazing of nickel and nickel base alloys. The techniques disclosed include producing a coated material (coated with either titanium or

niobium and either silver or gold material) and placing the coated material between adjacent surfaces to be bonded. The pieces are held together at a temperature in excess of 950.degree. C for a time period sufficient to achieve a solid state diffusion of the material into the nickel or nickel base alloy, and diffusion of the nickel or nickel base alloy into the joint area.

The Wells patent does not relate to plate-type heat exchangers with plates that are substantially manufactured in stainless steel and containing chromium. Indeed, the Wells patent does not even mention stainless steel or chromium. Nor does the Wells patent disclose one or more port channels surrounded by connection surfaces that include a material (with nickel) that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. Nor does the Office action make any contrary allegations.

Claims 35 and 36 should be allowable for at least the foregoing reasons.

Claim 56 also was rejected as being obvious over Fuerschbach in view of Usui and further in view of Wells.

Claim 56 depends from claim 49, which recites a method of manufacturing a plate heat exchanger including applying a material, which forms a connection surface and which permits brazing of said pipe member to the connection surface in a more easy manner than to stainless steel, where the material is more reduction susceptible than chromium dioxide and where the material includes nickel. The method also includes joining the heat exchanger plates to each other by means of a braze connection.

For reasons similar to those discussed above with reference to the rejections of claims 35 and 36, the cited references do not disclose or render obvious the claimed subject matter.

Claims 45 and 46 were rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara (US 4,497,772).

Claims 45 and 46 depend from claim 31, which recites a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium. The heat exchanger has

one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. The material includes nickel.

As discussed above with reference to claim 31, none of the cited references, alone or in combination, discloses or renders obvious the claimed subject matter.

Claims 45 and 46 should be allowable for at least the foregoing reasons.

Claims 59 and 60 also were rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara.

Claims 59 and 60 depend from claim 49, which recites a method of manufacturing a plate heat exchanger including applying a material, which forms a connection surface and which permits brazing of said pipe member to the connection surface in a more easy manner than to stainless steel, where the material is more reduction susceptible than chromium dioxide and where the material includes nickel. The method also includes joining the heat exchanger plates to each other by means of a braze connection.

For reasons similar to those discussed above with reference to the rejections of claims 45 and 46, the cited references do not disclose or render obvious the claimed subject matter.

Claim 57 was rejected as being obvious over Fuerschbach in view of Usui in view of Wells and further in view of an article from Encyclopedia Britannica, which was attached to the Action.

Claim 57 depends from claim 49, which recites a method of manufacturing a plate heat exchanger including applying a material, which forms a connection surface and which permits brazing of said pipe member to the connection surface in a more easy manner than to stainless steel, where the material is more reduction susceptible than chromium dioxide and where the material includes nickel. The method also includes joining the heat exchanger plates to each other by means of a braze connection.

As discussed above, neither Fuerschbach, Usui, Wells, nor any combination thereof, discloses or renders obvious the claimed subject matter. Nor does the article from Encyclopedia Britannica, alone or in combination with the other cited references, disclose or render obvious the claimed subject matter.

The article from Encyclopedia Britannica discloses, in relevant part, that preparation of brazing surfaces by mechanical or chemical polishing is important. The article does not disclose or renders obvious the subject matter that is missing from the other cited references. Nor does the Office action allege otherwise.

Claim 57 should be allowable for at least the foregoing reasons.

Claims 42 and 43 were rejected as being obvious over Fuerschbach in view of Usui and further in view of the article in the Encyclopedia Britannica.

Claims 42 and 43 depend from claim 31, which recites a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium. The heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. The material includes nickel.

As discussed above, none of the cited references, either alone or in combination, discloses or renders obvious the claimed subject matter.

Claims 42 and 43 should be allowable for at least the foregoing reasons.

Claim 48 was rejected as being obvious over Fuerschbach in view of Usui and further in view of Blomgren (US 6,016,865).

Claim 48 depends from claim 31, which recites a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium. The heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide. The material includes nickel.

As discussed above, neither Fuerschbach nor Usui discloses or renders obvious the claimed subject matter. Nor does the Blomgren patent disclose or render obvious the claimed subject matter.

The Blomgren patent discloses a plate type heat exchanger in which a washer 15 is brazed as part of plate heat exchanger assembly. *See* col. 4, lines 4-10. The Blomgren patent, however, does not disclose a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium, where the heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide and where the material includes nickel. Nor does the Office action allege otherwise.

Claim 48 should be allowable for at least that reason.

Conclusion

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this response should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this response.

Enclosed is a Petition for a One-Month Extension of Time. The petition fee in the amount of \$130.00 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to deposit account 06-1050, referencing Docket No. 09546-0027US1.

Respectfully submitted,

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